भारतीय मानक **IS 19042 : 2023**

Indian Standard

मोटा अनाज (श्रीअन्न) के प्राथमिक प्रसंस्करण के लिए प्रतीक और प्रवाह आरेख

Symbols and Flow Diagram for Primary Processing of Millets

ICS 65.060

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भारतीय मानक ब्यूरो
BUREAU OF INDIAN STANDARDS
मानक भवन, 9 बहादुर शाह ज़फर मार्ग, नई दिल्ली - 110002
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI - 110002
www.bis.gov.in www.standardsbis.in

December 2023 **Price Group 8**

Agriculture and Food Processing Equipment Sectional Committee, FAD 20

FOREWORD

This Indian Standard was adopted by the Bureau of Indian Standards, after the draft finalized by the Agriculture and Food Processing Equipment Sectional Committee had been approved by the Food and Agriculture Division Council.

Millets are exceptionally nutritious and were once a dietary staple. However, changing consumer preferences and a lack of millet processing resources led to a decline in their consumption. Millets require processing before consumption, and the government initiated efforts to promote millet consumption during the 2023 international year of millet (IYOM - 2023). Equipment used in primary processing of millet are very crucial for ensuring the quality of processed millets.

Equipment for primary processing for millet are now being extensively used in the country. It has, therefore, become necessary to have proper symbols for different components as well as flow diagrams for the entire process of milling. The adoption of these symbols would help in proper understanding and drawing of the system.

For the same purpose, a need was felt to develop an Indian Standard for symbols and flow diagrams for equipment used in primary processing of millets which will also facilitate consistency, innovation, and adherence to best practices in the milling industry, ultimately benefiting both manufacturer’s and processing industries.

A series of Indian Standards are being developed on the equipment used in primary processing of millets. Apart from this standard, three other standards on millets processing equipment have been published which are as under:

IS 19039 : 2023 Cleaner cum grader for millets with pre-cleaner — Specification and test code
IS 19040 : 2023 Millet Dehusker — Centrifugal type — Specification and test code
IS 19041 : 2023 Destoner for millets — Specification and test code

Another standard covering the specification for pearler-cum-polisher for millets is under preparation IS XXXXX : 20xx.

The composition of the Committee responsible for the formulation of this standard is given in Annex A.

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS 2 : 2022 ‘Rules for rounding off numerical values (*second revision*)’. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

Indian Standard

SYMBOLS AND FLOW DIAGRAM FOR PRIMARY PROCESSING OF MILLETS

1 SCOPE

This standard prescribes the symbols and flow diagram used in the primary processing of millets.

2 GENERAL FLOW CHART

A general millet milling flow chart is given in Fig. 1.

3 SYMBOLS

3.1 The symbols for various components of equipment used in primary processing of millets namely, pre-cleaning, cleaning and dehusking are given in Table 1.

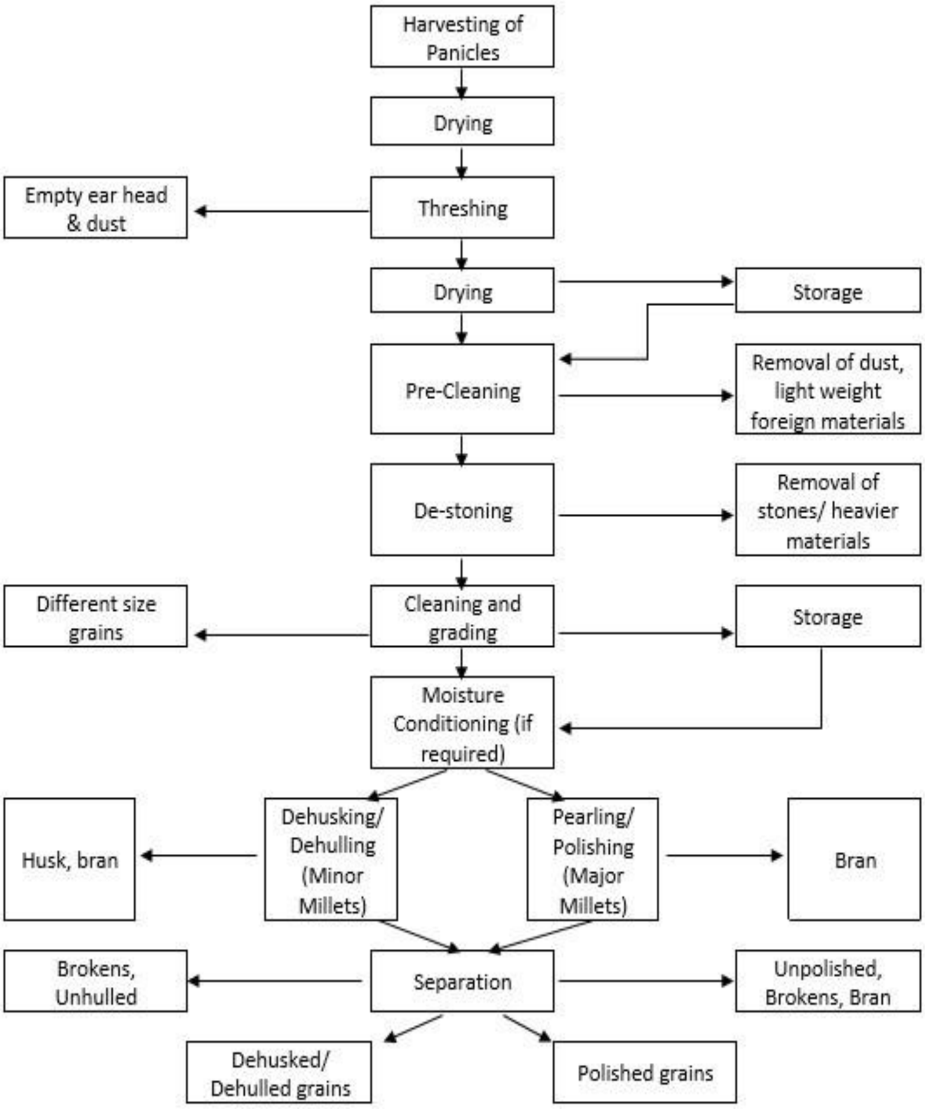

Harvesting of Panicles
Drying
Empty ear head & dust
Threshing
Drying
Storage
Pre-Cleaning
Removal of dust, light weight foreign materials
De-stoning
Removal of stones/ heavier materials
Different size grains
Cleaning and grading
Storage
Moisture Conditioning (if required)
Husk, bran
Dehusking/ Dehulling (Minor Millets)
Pearling/ Polishing (Major Millets)
Bran
Brokens, Unhulled
Separation
Unpolished, Brokens, Bran
Dehusked/ Dehulled grains
Polished grains

FIG. 1 GENERAL MILLET MILLING FLOW CHART

Table 1 Symbols Relating to Primary Processing of Milets Namely, Pre-Cleaning, Cleaning and Dehusking

(*Clause* 3.1)

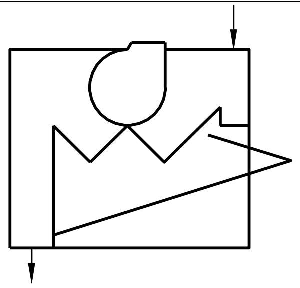
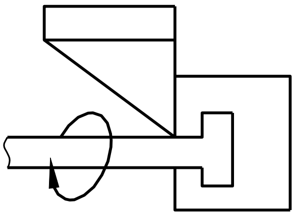
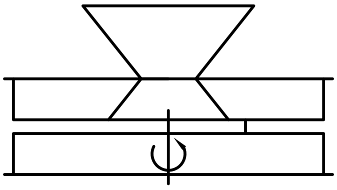
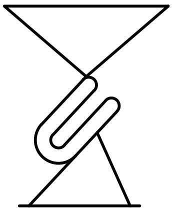
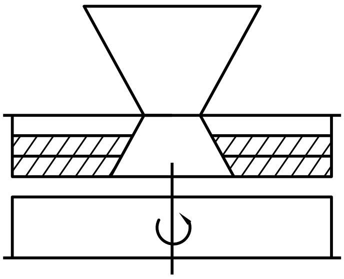
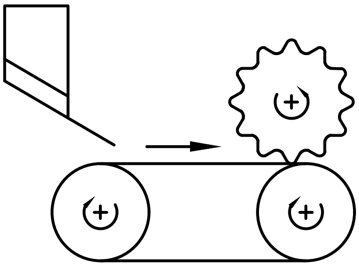
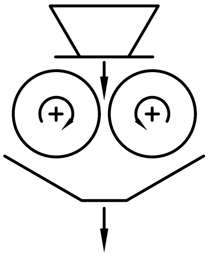
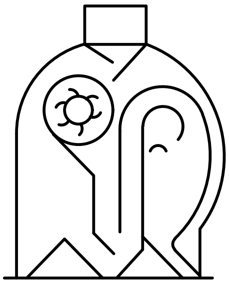
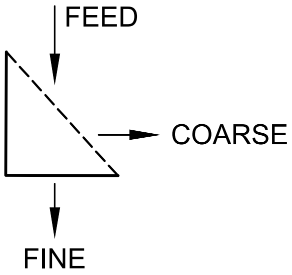
Sl No. (1)	Equipment/Process (2)	Symbol (3)
i)	Air screen cleaner cum grader	
ii)	Centrifugal sheller	
iii)	Disc sheller	
iv)	Magnetic separator	
v)	Rubber and disc sheller	
vi)	Rubber belt sheller	

Table 1 (*Concluded*)

Sl No.	Equipment/Process	Symbol
(1)	(2)	(3)
vii)	Rubber roll sheller	
viii)	Scalper	
ix)	Screen/sieve	

3.2 The symbols for various components of equipment used in primary processing of millets including separation and grading are given in Table 2.

Table 2 Symbols Relating to Separation and Grading

(*Clause* 3.2)

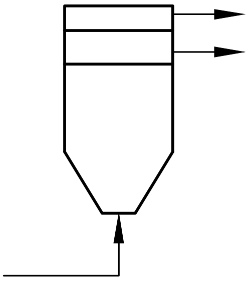
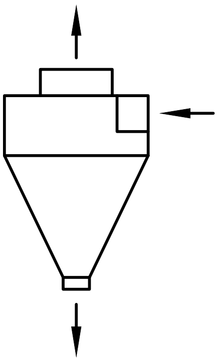
Sl No.	Equipment/Process	Symbol
(1)	(2)	(3)
i)	Centrifuge	
ii)	Cyclone separator	

Table 2 (*Continued*)

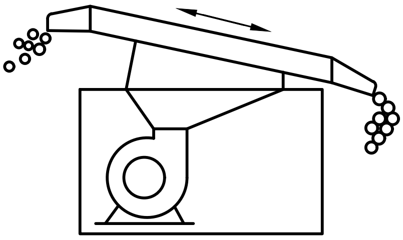
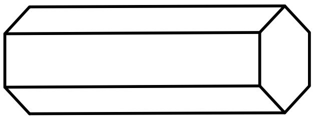
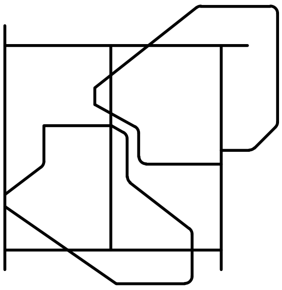
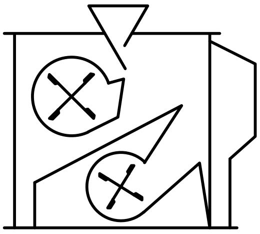
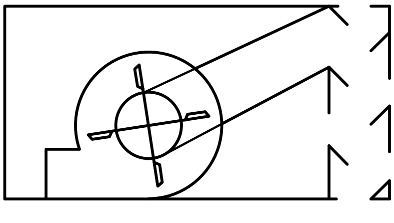
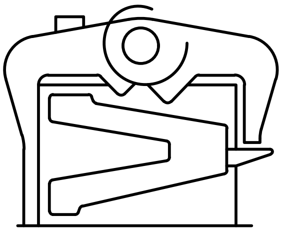
Sl No.	**Equipment/Process**	**Symbol**
(1)	(2)	(3)
iii)	Destoner	
iv)	Hexagonal reel	
v)	Husk depression separator	
vi)	Husk pressure separator	
vii)	Husk suction separator	
viii)	Husk suction separator with riddle	

Table 2 (*Continued*)

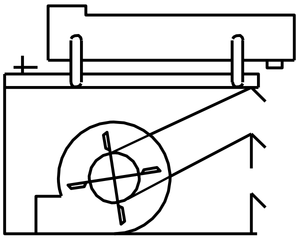
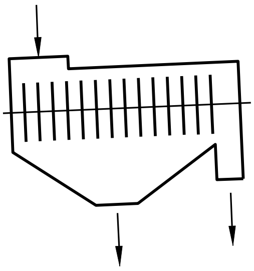
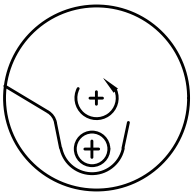
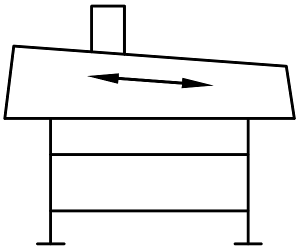
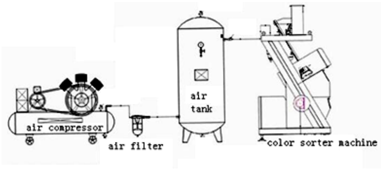
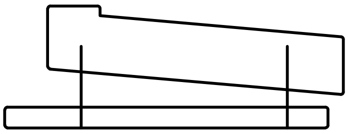
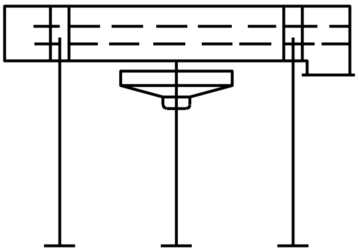
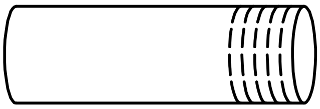
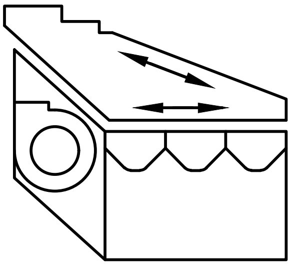
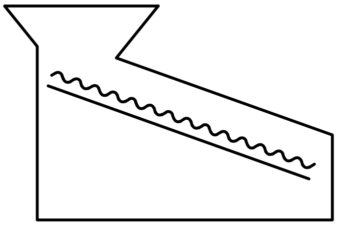
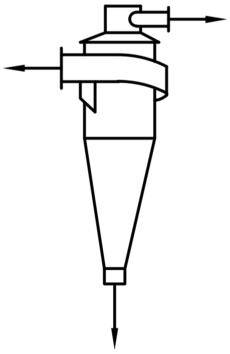
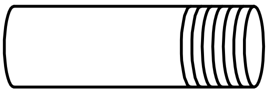
Sl No.	Equipment/Process	Symbol
(1)	(2)	(3)
ix)	Husk suction separator with superior riddle	
x)	Indented disc separator	
xi)	Indented cylinder	
xii)	Millet separator	
xiii)	Optical colour sorter	 air compressor air filter air tank color sorter machine
xiv)	Riddle	

Table 2 (*Concluded*)

Sl No.	Equipment/Process	Symbol
(1)	(2)	(3)
xv)	Rotary sieve classifier (plan sifter) for milled millet	
xvi)	Slot perforated grading cylinder	
xvii)	Specific gravity separator	
xviii)	Static screen Millet separator	
xix)	Super cyclone separator	
xx)	Wire spiral grading cylinder	

3.3 The symbols for various components of equipment used for polishing and glazing of millet are given in Table 3.

Table 3 Symbols Relating to Polishing, Glazing, Crushing and Mixing

(*Clause* 3.3)

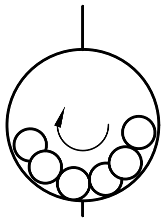
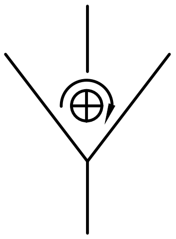
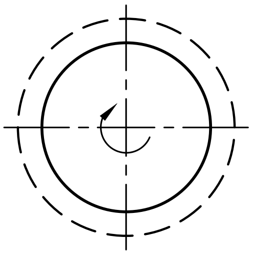
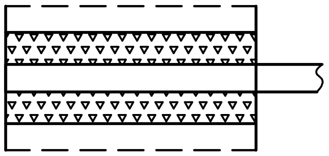
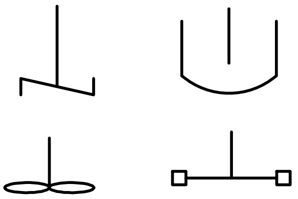
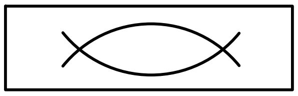
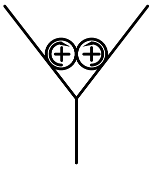
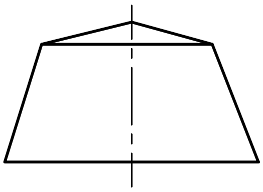
Sl No.	Equipment/Process	Symbol
(1)	(2)	(3)
i)	Ball mill	
ii)	Crusher	
iii)	Friction polisher	
iv)	Horizontal emery polisher	
v)	Mixers	
vi)	Ribbon blender	
vii)	Roller crusher	

Table 3 (*Concluded*)

Sl No. (1)	**Equipment/Process** (2)	**Symbol** (3)
viii)	Whitening or pearling cone	

3.4 The symbols for various accessories are given in Table 4.

Table 4 Symbols for Accessories

(*Clause* 3.4)

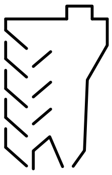
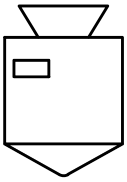
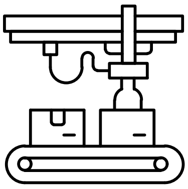
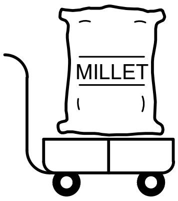
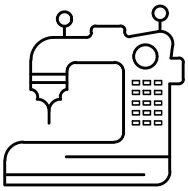
Sl No. (1)	**Equipment/Process** (2)	**Symbol** (3)
i)	Air cleaner	
ii)	Automatic scale	
iii)	Bag filling machine	
iv)	Bag loading machine	
v)	Bag sealing/stitching machine	

Table 4 (*Continued*)

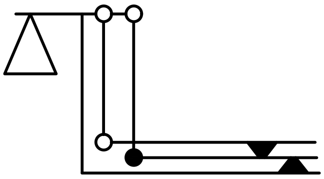
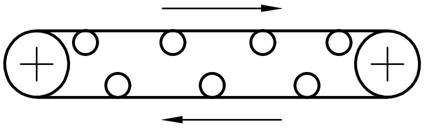
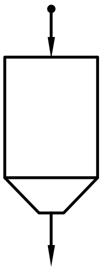
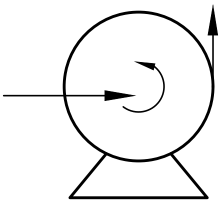
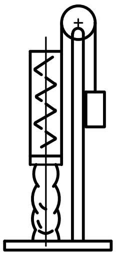
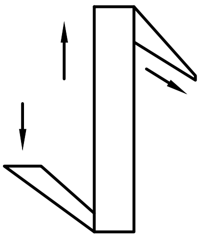
Sl No.	**Equipment/Process**	**Symbol**
(1)	(2)	(3)
vi)	Beam scale	
vii)	Belt conveyor	
viii)	Bin	
ix)	Blower/centrifugal pump	
x)	Bran sacking machine	
xi)	Bucket elevator	

Table 4 (*Continued*)

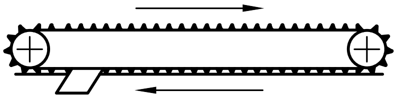
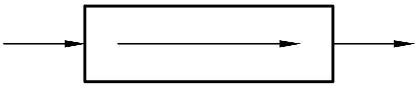
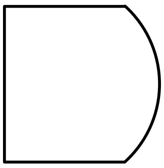
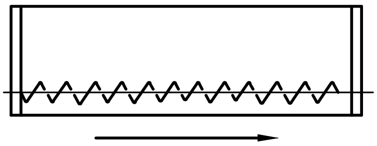
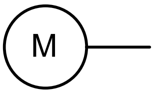
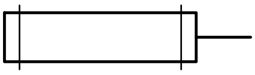
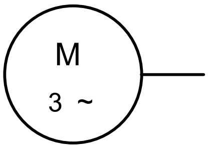
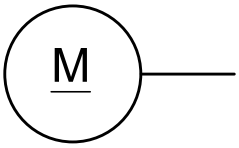
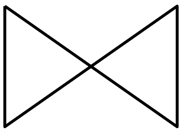
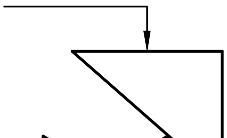
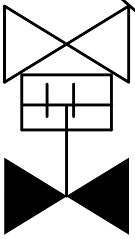
Sl No. (1)	Equipment/Process (2)	Symbol (3)
xii)	Chain conveyor	
xiii)	Conveyor	
xiv)	Delay	
xv)	Depression chest with screw conveyor	
xvi)	Electric motor – a.c.	 
xvii)	Electric motor – a.c. 3 phase	
xviii)	Electric motor – d.c.	
xix)	Gate valve	
xx)	Hopper	
xxi)	Hydraulic valve	

Table 4 (*Continued*)

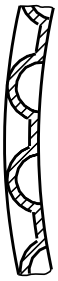
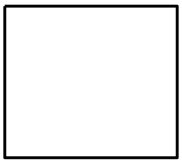
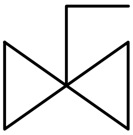
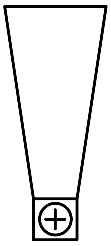
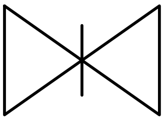
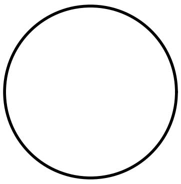
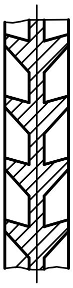
Sl No. (1)	Equipment/Process (2)	Symbol (3)
xxii)	Indented discs	
xxiii)	Inspection	
xxiv)	Manually operated valve	
xxv)	Mixer	
xxvi)	Needle valve	
xxvii)	Operation	
xxviii)	Packer discs	

Table 4 (*Continued*)

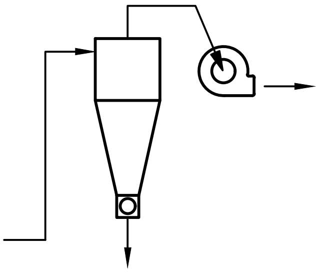
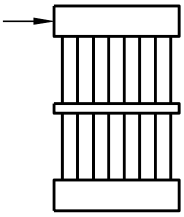
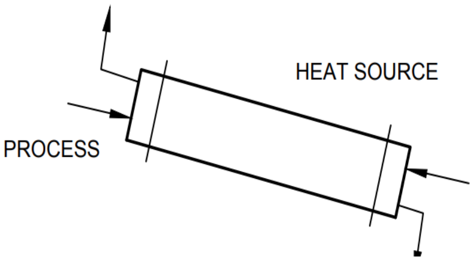
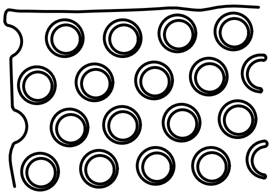
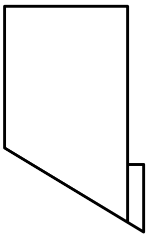
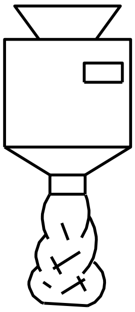
Sl No.	Equipment/Process	Symbol
(1)	(2)	(3)
xxix)	Pneumatic conveyor	
xxx)	Pressure filter	
xxxi)	Rotary dryer	
xxxii)	Round hole perforated plate	
xxxiii)	Sacking bin	
xxxiv)	Sacking scale	

Table 4 (*Continued*)

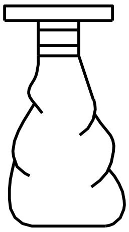
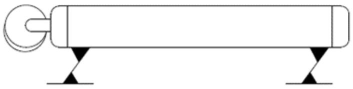
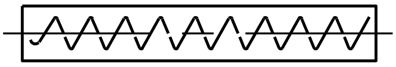
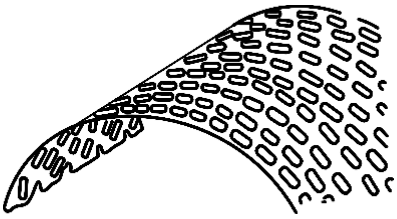
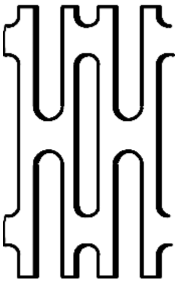
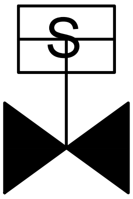
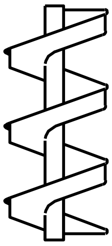
Sl No.	Equipment/Process	Symbol
(1)	(2)	(3)
xxxv)	Sacking spout	
xxxvi)	Sacking tube conveyor	
xxxvii)	Screw conveyor	
xxxviii)	Slot perforated grading sieve	
xxxix)	Slot perforated plate	
xl)	Solenoid valve	
xli)	Spiral sack slid	

Table 4 (*Continued*)

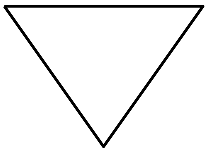
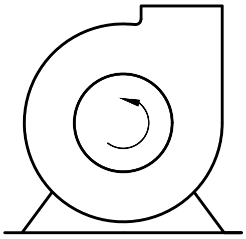
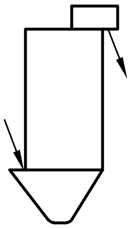
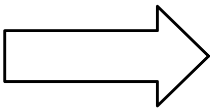
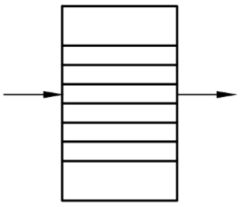
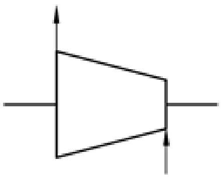
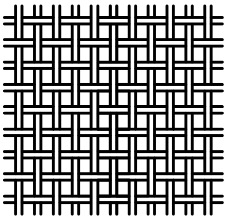
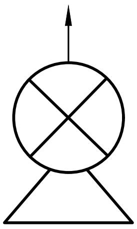
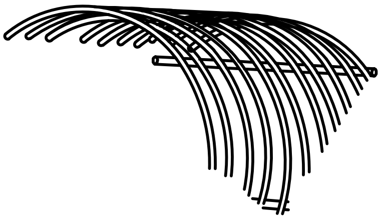
Sl No.	Equipment/Process	Symbol
(1)	(2)	(3)
xlii)	Storage	
xliii)	Suction fan	
xliv)	Suction filter	
xlv)	Transportation	
xlvi)	Tray dryer	
xlvii)	Turbine	
xlviii)	Wire mesh	

Table 4 (*Concluded*)

Sl No. (1)	Equipment/Process (2)	Symbol (3)
xlix)	Volumetric measure	
l)	Wire spiral grading sieve	

ANNEX A

(*Foreword*)

COMMITTEE COMPOSITION

Agriculture and Food Processing Equipment Sectional Committee, FAD 20

Organization	*Representative(s)*
Indian Council of Agricultural Research, New Delhi	Dr Shyam Narayan Jha ***(Chairperson)***
Agriculture Machinery Manufacturers Association, Pune	Dr Surendra Singh Shri Mitul Panchal (*Alternate*)
CCS Haryana Agricultural University, Hisar	Dr Ravi Gupta
CSIR - Central Food Technological Research Institute, Mysuru	Dr Umesh Hebbar Dr Navin Kumar Rastogi (*Alternate*)
Dr Panjabrao Deshmukh Krishi Vidyapeeth, Akola	Dr Suchita V. Gupta Dr Bhagyashree N. Patil (*Alternate*)
ICAR - Central Institute for Women in Agriculture, Bhubaneswar	Dr Sachidananda Swain Er Chaitrali S. Mhatre (*Alternate*)
ICAR - Central Institute of Agricultural Engineering, Bhopal	Dr S. K. Giri Dr Ravindra Naik (*Alternate*)
ICAR - Central Institute of Post-Harvest Engineering and Technology, Ludhiana	Dr Sandeep Mann Dr Sandeep P. Dawange (*Alternate*)
ICAR - Indian Institute of Horticultural Research, Bengaluru	Dr A. Carolina Rathina Kumari Dr S. Bhuvaneswari (*Alternate*)
Indian Council of Agricultural Research, New Delhi	Dr K. Narsaiah Dr Krishna Pratap Singh (*Alternate*)
Indosaw Industrial Products Private Limited, Ambala	Dr Vinod H. Kalbande
Mahatma Phule Krishi Vidyapeeth, Rahuri	Dr Vikram Parasharam Kad
Ministry of Agriculture, Department of Agriculture, New Delhi	Shri C. R. Lohi Shri Y. K. Rao (*Alternate*)
National Committee on Precision Agriculture and Horticulture, New Delhi	Shri Anand Zambre Shri Krishna Kumar Kaushal (*Alternate*)
National Institute of Food Technology, Entrepreneurship and Management, Thanjavur	Dr S. Bhuvana
North Eastern Region Farm Machinery Training and Testing Institute, Biswanath Chariali	Dr P. P. Rao Shri S. G. Pawar (*Alternate*)
Northern Region Farm Machinery Training and Testing Institute, Hisar	Dr Mukesh Jain Shri Sanjay Kumar (*Alternate*)
Punjab Agricultural University, Ludhiana	Dr Sandhya Singh Dr Maninder Kaur (*Alternate* I) Dr Rohit Sharma (*Alternate* II)

Organization	*Representative(s)*
Tamil Nadu Agricultural University, Coimbatore	Dr V. Thirupathi Dr P. Rajkumar (*Alternate* I) Dr P. Sudha (*Alternate* II)
In Personal Capacity (*CD 223, Ansal Golf Link 1, Greater Noida - 201315*)	Dr Pitam Chandra
In Personal Capacity (*MIG - 154, E-7 Sector Aerea Colony, Bhopal - 462061*)	Shri S. D. Deshpande
In Personal Capacity (*12/36 Sowbhagya Nagar, A Block Civil, Aerodrome Post, Coimbatore - 641014*)	Dr R. Visvanathan
BIS Directorate General	Shrimati Suneeti Toteja, Scientist 'E'/Director and Head (Food and Agriculture) [Representing Director General (*Ex-officio*)]

Member Secretary
Shri Pradeep Sharma
Scientist 'B'/Assistant Director
(Food and Agriculture), BIS

Panel to Formulate New Standards on Equipment Used in Primary Processing of Millet, FAD20/P16

Organization	*Representative(s)*
ICAR - Central Institute of Agricultural Engineering, Bhopal	Dr Ravindra Naik **(*Convenor*)** Dr Debabandya Mohapatra
ICAR - Central Institute of Post-Harvest Engineering and Technology, Ludhiana	Dr R. K. Vishwakarma
Indian Institute of Millet Research, Hyderabad	Dr B. Dayakar Rao
Tamil Nadu Agricultural University, Coimbatore	Dr P. Sudha
National Institute of Food Technology, Enterpreneurship and Management, Thanjavur	Dr V. Palalnimuthu
University of Agricultural Sciences, Raichur	Dr Uday Kumar Nidoni
In Personal Capacity (*12/36 Sowbhagya Nagar, Aerodrome Post, Coimbatore - 641014*)	Dr R. Visvanathan

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